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and widespread oriental species; the third is a new *Pontodilus* — a seashore inhabitant.

The classification of crabs is undertaken by Borradaile, who thereupon describes the crabs from the Archipelagoes belonging to the Catometope and Oxystomata. As before, especial stress is laid on bionomics and adaptations. A collection of 16 species of Barnacles is also described. Most of them are Indo-Pacific species, but two occur in the West Indies. Lanchester's study of the Stomatopods, based as it is on the study of individual variation will be of interest and, it is hoped, of instruction to the species splitter. Excepting two specimens of *Pseudosquilla ciliata* all the adults belong to the world-wide *Gonodactylus chiragra*, including seven synonyms. *Gonodactylus* lives *on the surface* of reefs and is abundant here. *Squilla*, which demands mud to burrow in, is absent; because the mud is. This is another illustration of the law that the habitat of a species is determined by its instincts. The author introduces "*term*" to express the extremes of structural type in a continuous variation.

Finally the Lithothamnia are described by M. Foslie, who combats the erroneous notion that these Algæ are more abundant in tropical than in northern seas.

C. B. D.

**Webster's "Diffusion of Insects in North America."**—In the April number of *Psyche* we have a very interesting article on the above subject, from the pen of Professor F. M. Webster, who has already contributed various papers of the same general nature to our entomological journals.

The problem of the nature and extent of destruction of life during the Glacial epoch is but barely touched upon, the intention of the author being to show how post-glacial distribution has been accomplished. He points out that with the retreat of the ice three gateways for the introduction of species into this continent were open — (1) the Alaskan chain for Asiatic insects, (2) Central America for forms from South America, and (3) Florida, by way of the West Indies as an alternative to the Central American route. All new life depending to any large extent upon land for its introduction must come by some one of these three roads, the agency of man in the matter being of so recent an origin as to need separate consideration.

The northwestern gateway, leading from Asia, seems to have been taken advantage of by numerous Coccinellidæ and certain Chrysome-

lidæ. Some of these have a much more extended range in this continent than in the Old World, *Lina lapponica* for example being found as an European species only in the extreme north, while with us it reaches south as far as Texas. This adaptability is a potent factor in distribution and the readiness with which a given species assimilates with new surroundings has a powerful bearing upon its final geographical range. Insects coming to us from Asia by the path mentioned may spread to the south through the great valleys lying between the Rocky Mountains and the Cascades or by use of the passes in the former range gain the great plains of Canada and eventually appear on the Atlantic coast. If their nature is such as to enable them to bear an arid or warm climate they may reach points far to the south since there are no great natural barriers in the way.

The southwestern gateway is, in Professor Webster's opinion, by far the most important since through it we receive accessions from the rich fauna of Central and South America. As a striking example of a fauna received through this medium he cites *Halisidota*, a genus of moths apparently South American in type. Some of our forms are supposed to have had their origin in the South and to have come to us by way of Central America. A certain species with a present range from Argentina to Costa Rica is thought to be the stem of our *H. tessellaris* and *H. citripes*, which seem to have reached us by two different courses—the one coming north by way of Texas, the other east by way of Yucatan and Cuba. The distribution of Pacific and northern *Halisidotæ* indicate to the author the probability of certain species having reached (through stem forms) the New England coast by following the Pacific Maritime trend from Central America through California, Oregon, Washington and British Columbia, thence traveling eastward along the lines indicated for the immigrants of Asiatic origin. The genus *Diabrotica*, among the beetles, warrants the belief that offshoots of a common Central American stem may become separated far to the south, one going to the Pacific district while its fellow inhabits the Atlantic slope.

But little matter concerning the antillean trend is presented, this being thought of less importance than the others, though many insects appear to have come in that way.

Concerning the route taken by insects introduced through the eastern ports by agency of man, Professor Webster has ascertained that they follow a path which he calls the transappalachian trend—reaching the fertile prairies of the interior through the great gap in New York which forms the principal thoroughfare for insect invasion.

A glance at the map with which the paper is illustrated suggests the thought that we have in Professor Webster's article a strong defense of the Wallacean theory of distribution and of the important part played by barriers in determining the spread of animal life; it is to be regretted that the recent propaganda of the theory of isothermal distribution of organisms, while undoubtedly of great value in indicating the possibility of artificial cultivation, has tended to obscure the importance of geographical features under really natural conditions.

H. F. WICKHAM.

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## BOTANY.

**Livingston's Osmotic Pressure and Diffusion in Plants.**<sup>1</sup> — The author begins with a treatment of the purely physical phenomena connected with diffusion and osmosis, rightly holding that it is difficult for the student of physiology to easily obtain the information he needs in compact form. Such a treatment covering, as it does but forty-four pages could not possibly be detailed, nor does the author maintain that it is. Nevertheless a summary of this kind can be exceedingly useful, if in no other way than to stimulate the student to further reading. This *résumé* is clear and sufficiently full to give an adequate conception of the theories concerned. There are six chapters in the first part, which treat of the fundamental theories of the nature of matter, of diffusion and diffusion tension, of solutions and ionization, of osmotic phenomena and the measurement thereof.

In the second part on the physiological aspect of the matter, the author continues his summarization of the work which has been done, but of course in far greater detail than in the previous half, since the field is smaller and since this is the real object of the book. In the first chapter the question of turgidity is taken up. The importance of this subject demands full treatment, and forty-two pages are devoted to it; the author does not develop anything new, however. In the even more complicated, and certainly more dubious, matter of the absorption and transmission of water, which is consid-

<sup>1</sup> Livingston, Burton E. *The Role of Diffusion and Osmotic Pressure in Plants*. The Decennial Publications of the University of Chicago. Second Series, vol. 7. The Univ. of Chicago Press, 1903. 8vo, pp. i-xiii, 1-149.